ecology and environment, inc.
Global Environmental Specialists
720 Third Avenue, Suite 1700
Seattle, Washington 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: January 28, 2015

TO: Linda Ader, Project Manager, Ecology and Environment, Inc., Seattle, WA

FROM: Mark Zawistoski, START GIS Specialist,
Ecology and Environment, Inc., Seattle, WA

SUBJ: Grain Handling Facility at Freeman, TDD: 14-09-0004
2014 EPA Freeman Ground Water Contamination Site Inspection, Contaminated Soil Volume

An estimated volume of the known extent subsurface soil contaminated with carbon tetrachloride/chloroform at the Grain Handling Facility at Freeman was determined using both field and fixed laboratory data generated under the EPA 2014 Freeman Ground Water Contamination Site Inspection (E & E 2014) from subsurface soil samples collected at the grain handling facility. A total of six boring locations had contaminated samples. These were borings were SB09 through SB14. The interval of contamination in each boring is as follows based on contaminated sample depths:

- SB09 – 19 to 25 feet bgs (samples SB09SB19.5 and SB09SB25)
- SB10 – 18 to 20.5 feet bgs (samples SB10SB18.5 and SB09SB20.5)
- SB11 – 19 to 32 feet bgs (samples SB11SB20, SB11SB21.5, SB11SB28, and SB11SB32)
- SB12 – 28 to 28.5 feet bgs (sample SB12SB28.5)
- SB13 – 19 to 30 feet bgs (samples SB13SB20, SB13SB21.2, SB13SB23, SB13SB27.5, and SB13SB30)
- SB14 – 17.5 to 23.5 feet bgs (samples SB14SB18, SB14SB21.5, and SB14SB23.5)

Geographic Information System software (ESRI ArcGIS), including the 3D Analyst and Spatial Analyst Extensions, was used to develop an estimate of the volume of contaminated soil of 36,320 cubic feet, or 1,345 cubic yards. The coordinate system for all dataset creation and analysis is the Washington State Plane-North (NAD 1983, feet). Soil Boreholes (SB09 - SB14) were interpolated into two (2) separate Triangulated Irregular Network (TIN) datasets. One TIN represented the top of the aforementioned soil boreholes; the other complimentary TIN dataset represented the bottom depth extent for the same boreholes. These two TIN datasets were subtracted (utilizing Raster Calculator) to obtain the estimated amorphously-shaped layer of contaminated subsurface soil into an ESRI Grid raster format.

Utilizing ArcGIS 3D Analyst Extension, Functional Surface/Surface Volume tool, the ESRI Grid dataset determined the final volume estimation of contaminated subsurface soil.

References

E & E (Ecology and Environment, Inc.), July 2014, *Site Inspection, Freeman Ground Water Contamination, Freeman, Washington*, prepared for United States Environmental Protection Agency, Contract Number EP-S7-13-07, Technical Direction Document Number 13-07-0005.